

Computer Science Tripos Part IB

Group Design Projects 2019—2020

<group-project@cl.cam.ac.uk>

Project Briefing – Michaelmas 2019
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Important Dates

Thursday 21/11/2019 – 12 noon, LT1	Briefing lecture
Wednesday 04/12/2019 – before noon	Individual topic preferences
Thursday 16/1/2020 – 2pm, LT1	Project kick-off meeting
Friday 24/1/2020 – before noon	Group risk report
Wednesday 29/1/2020 to Friday 31/1/2020	First formal review meetings
Tuesday 4/2/2020 – 2pm, LT1	Lecture on presentation skills
Wednesday 12/2/2020 to Friday 14/2/2020	Second formal review meetings
Friday 21/2/2020 – before noon	Individual progress assessment
Wednesday 26/2/2020 to Friday 28/2/2020	Third formal review meetings
Monday 2/3/2020	Code completion deadline
Wednesday 4/3/2020	Public presentation of results
Friday 6/3/2020 – before noon	Final individual report

All communication regarding the group projects should be addressed to the *group project email address* **group-project@cl.cam.ac.uk**, in order to reach all members of the organizing team.

Learning Objectives and Assessment

The group design project course is an opportunity for you to gain experience of a real software development project, emulating as closely as possible the experience of a professional project. The main goals of the course are learning how to work in a team, learning how to work with a professional client, and learning how to plan and follow a systematic management process through all the phases of a software development project. Group projects are expected to take 30—60 hours of work, spread over six weeks, and to enable you to demonstrate your skills and understanding across a broad range of subjects.

For most students, this will also be the most significant technical challenge you have ever faced. The design briefs are deliberately intended to push the bounds of what you can achieve, often involving new technologies, substantial engineering effort, or addressing research problems that have never been solved before.

Credit for this course will be awarded to recognize that you have achieved these goals:

1. Worked effectively with the members of your team
2. Maintained a professional relationship with your client
3. Personally made a substantial technical contribution

Every project is different. The technical challenges and clients are very different. Within each team, every member must make many different contributions, planned and agreed between you to suit each person's experience and aptitude. There will be many managerial challenges – some within your control, and some not.

Because the projects, groups, clients and individual roles are so diverse, we do not try to assess one person's performance relative to another. We award four standard ticks, to recognize that you have achieved the three goals above. One tick is awarded to all members of the group, to recognize that the project has succeeded. The three remaining ticks are awarded to each member of the group, to recognize that this person has achieved each of the goals above *including a substantial technical contribution*.

The expectation is that all students should receive all four ticks. If you are struggling with any of these goals, and believe there is any risk that you

might not receive ticks as a result, please discuss the situation with your Director of Studies at the earliest opportunity. If you have severe concerns, please also discuss the situation with your College Tutor, and send email to the *group project email address*. All personal correspondence to this address is treated confidentially, being read only by the group project organisers and the student administration team.

Course Structure

The group design project course has several phases, each involving different kinds of activity that may need to be scheduled across different weeks, days and times, as decided in your own group's project plan. The lecture timetable also reserves slots from 11:00 to 13:00 on each Tuesday and Thursday of Lent term. These are to give time for groups to meet in order to conduct their internal co-ordination. Meeting rooms can be booked on a first-come, first-served basis from Student Admin.

The three main phases each end in a **formal review meeting** with your project client. The time and place of these meetings has been negotiated with the clients in advance, based on many constraints, including long-distance travel in some cases. Attendance at client meetings, at the negotiated times, is **compulsory** for all students. **Failure to attend will jeopardise one or more of your ticks.** If you become aware of anything that might prevent you from attending a client meeting, please notify us via the *group project email address* as soon as possible. A note from your College Tutor may be presented in mitigation. Other group members should also be kept informed of the situation.

Before each client meeting, a formal document will be delivered. This should be prepared as a PDF document, which is sent to the client by email. The delivery should be made before 12 noon on the day preceding the actual meeting, so that the client has time to review it. The email containing the deliverable document must be copied to the *group project email address*, and the team name should appear in the subject line of each email. **It is essential that copies of all deliverables are sent to the project organizers, as these copies will be used for assessment.**

I. Briefing and project selection

In Michaelmas term, the design briefs are presented to students. The full set of design briefs can be viewed at:

<https://www.cl.cam.ac.uk/teaching/group-projects/>

You may express a first, second and third preference via the Moodle IB Group Project selection tool:

<https://www.vle.cam.ac.uk/>

Note that some projects are far more popular than others, so there is no guarantee you will be assigned to your first preference (or indeed any of your preferences). You will be expected to work on whatever project you are assigned to, with colleagues that you have not chosen.

INDIVIDUAL ACTION: *every student* records topic preferences via Moodle

II. Kickoff and risk analysis

The group membership, clients and assigned project briefs will be announced at the kick-off meeting on the first Thursday of the Lent term.

If there is a serious reason for members of a group to feel that they will not be able to work together, they must inform the project organizers immediately. No requests for changes in group membership will be considered after the kick-off meeting.

Each team must elect a *contact person*, who will take responsibility as the primary point of contact with the client, and with the group project administration team.

The team should then review the technical and managerial risks, decide which are most serious, and document these in 50 words or less.

ACTION: *contact person* introduces themselves to group project administration team via the *group project email address*.

ACTION: *contact person* sends an email of 50 words or less to the *group project email address*, documenting main risks.

III. Requirements analysis phase

The first major task is to turn a relatively open and informal design brief into a formal ***functional specification*** and a ***project plan*** to implement it. You should take care not to develop an over-elaborate specification that will commit you to more work than necessary.

The *functional specification* should include:

- a general investigation of the problem and its background;
- the functionality to be provided;
- the major components of the system;
- interface specifications for those components;
- acceptance criteria for the finished product;
- a management strategy for the group; and
- technical contributions to be made by each member

The *project plan* should set out the tasks assigned to each person, taking account of estimated time to complete each task, and dependencies between them. It is important to work to an overall budget of no more than 60 hours per member.

Each member of the group is expected to make a technical contribution, and to gain substantial experience of programming in the course of the project. This might involve test harnesses or scripts, data conversion utilities, a tutorial system, external interfaces, demonstration examples, or other code as appropriate to the project and the individuals in the team.

DELIVERABLE: Functional Specification and Project Plan

ACTION: *contact person* sends an email with PDF deliverable attached, by noon the day before the project meeting, to both *client* and *group project email address*

ACTION: *all members of the team* attend the formal client meeting

IV. Implementation phase

The second major task is to write the code of individual components and test them in isolation. This is likely to require the construction of special

test harnesses for modules or classes. The deliverable for this task is a written ***progress report***, documenting the components that have been implemented, and describing the test procedures and results.

At the end of this phase, every student must also review their personal contribution to the project so far, making an interim assessment using a questionnaire accessed via the Moodle VLE.

DELIVERABLE: Group Progress Report

ACTION: *contact person* sends an email with PDF deliverable attached by noon the day before the project meeting, to both *client* and *group project email address*

ACTION: *all members of the team* attend the client meeting

INDIVIDUAL ACTION: *every student* assesses their own progress by completing assessment questionnaire on Moodle.

V. ***Testing and integration phase***

The third major task is to piece the whole system together, test it, prepare it for public demonstration, and ensure that it is adequately documented.

The team must then work together to write a ***final report***. This report should describe the project's successes and failures, elaborate on any lessons learned, and document the work done by each member of the team, including sections describing each person's specific technical contributions.

The deadline for code completion is noon on the Monday before the presentations. At that time, a copy of the group file space will be taken for examiners. No credit will be given for features added after this.

DELIVERABLE: Final Group Report

ACTION: *contact person* sends an email with PDF deliverable attached by noon the day before the project meeting, to both *client* and *group project email address*

ACTION: *all members of the team* attend the client meeting

ACTION: *all members of the team* must ensure that the MCS Linux filespace for the group contains the complete source code of the project.

VI. *Public presentation*

Clients, Computer Lab staff and guests are invited to an exhibition and presentation of final results. All groups set up demonstrations to show their working products during a two-hour public exhibition. This is followed by a rapid-fire presentation session, in which each group gives a four-minute presentation. At the end of the presentation session, clients, staff and guests vote to award achievement prizes.

ACTION: any special requirements for the exhibition or presentation session should be requested via the *group project email address* by noon on the day before the presentation (preferably earlier – the earliest requests will receive preference).

ACTION: PDF file containing presentation slides must be sent by email to the *group project email address* by noon on the day before the presentation.

VII. *Reflection and review*

Finally, every student must write an individual personal report including four sections:

- 1) reflection on your overall experience;
- 2) summary of your personal contribution to the work of the team;
- 3) your assessment of the contributions made by *each other member* of the team; and
- 4) a sample of source code demonstrating one of your key technical contributions.

INDIVIDUAL ACTION: *every student* writes a personal report in PDF format, and submits the report as a Moodle assignment.

Technical Considerations

Projects may involve technical topics spanning everything you have learned on the Tripos so far. Almost all projects will also require you to learn new things. Some of this will draw on content taught later in the Tripos, which some members of the group may need to become familiar with. Some will involve learning about new programming languages or tools. Some might involve original research, or learning about new technologies for which there is little documentation.

Members of the group must help each other to work out what skills you have, and what you need to learn. Some projects may require specialist knowledge or proprietary information that your client will provide, while others can draw on technical expertise from within the Computer Laboratory or elsewhere in Cambridge. Some design briefs may include guidance, but we expect you to use your own resources beyond this.

Except where mentioned in the design brief, there are very few other constraints on the technical approach you take. You are free to use open source tools and new programming languages as appropriate. However, you should remember that all members of the group must make a substantial technical contribution, and that tools should be chosen accordingly. All CST students are familiar with Java, meaning that this will be a natural choice for many aspects of a typical project.

There are a wide variety of software development tools and facilities provided on the MCS Linux system, and this should be a valuable resource for many projects. The full set of tools available is documented at:

http://www.ucs.cam.ac.uk/desktop-services/mcs/software/copy_of_linuxlist

Every group is assigned a personal filespace under MCS Linux, accessed via `${CLTEACH}/grpproj` with sub-directories `alpha`, `bravo`, ... for each group. Group members have access privileges for the appropriate directory. You are not obliged to use MCS Linux for development work, but every group must deposit an archive copy of their source code in the group directory, to be used in project assessment. Disk usage should be kept below 100 Mbytes for source code, test data and documentation.

If desired, a project website can be published by creating a sub-directory called “public_html” which will map to the URL

`http://groups.ds.cam.ac.uk/clteach/grpproj/{group name}`

Some projects require use of special purpose hardware borrowed from clients, sponsors, or other sources. At the end of the project, all hardware must be returned. The final group tick will not be awarded until this has been done.

Some projects may include electronic or mechanical construction. In cases where a project involves significant hardware design, a demonstrator may be appointed to provide technical assistance such as advice on selection and purchase of electronic components, or access to workshop facilities.

After the Project

We encourage you to think about ways that you might take forward the work done by your project team. The formal course and assessment ends after you have made your personal report and ticks have been decided. Anything that happens after this will not affect your grade for Tripos assessment, but could have other benefits.

Some possibilities include: publishing your code as the basis of an open source project; contributing it to an existing open source project; starting a company to exploit the results of your work; licensing your code to another company or to a charity, school or other organization that might benefit; visiting your client’s company to promote or transfer what you have learned; being employed as an intern in the summer between Part IB and Part II; proposing a Part II individual project to further develop ideas; and many other alternatives.

If you do continue to use the work of the team in any of these ways, you need to ensure that every member of the team agrees they have been fairly treated. This will require discussion of who holds the copyright in source code or other intellectual property, and consideration of how any revenue should be fairly divided. It may be helpful to discuss these questions with your client, either at the final meeting, or by email afterward. The group project organisers can also advise if requested.

Whether or not you make further use of the results from the project, the group design project course will have been a key preparation for your future professional career.

During the project itself, your interaction with the client, your formal reports, and your personal reflection will have been a valuable learning opportunity in understanding the ways that the management techniques you have been taught can be used to achieve objectives, as well as applying your understanding of the methods and issues involved in deploying systems to meet business goals.

Behaviour

While we leave organization within the group to the group itself, we will not tolerate offensive or inappropriate behaviour. Inappropriate behaviour includes bullying or harassment on account of sex (including gender reassignment), race, ethnic or national origin, colour, disability, sexuality, religion or belief, or age.

Bullying is a form of psychological harassment. It is intimidation that serves to undermine the self-esteem, confidence, competence, effectiveness and integrity of the bully's target. Bullying behaviour may include continual, undeserved criticism, belittling remarks, shouting, swearing and offensive language, constant interruption in discussion, and the display of overbearing or intrusive behaviour. *You should report any such behaviour to the course organizers whether or not it is directed at you.*